

Name Key + 77 Date \_\_\_\_\_

## AP: CHAPTER 6

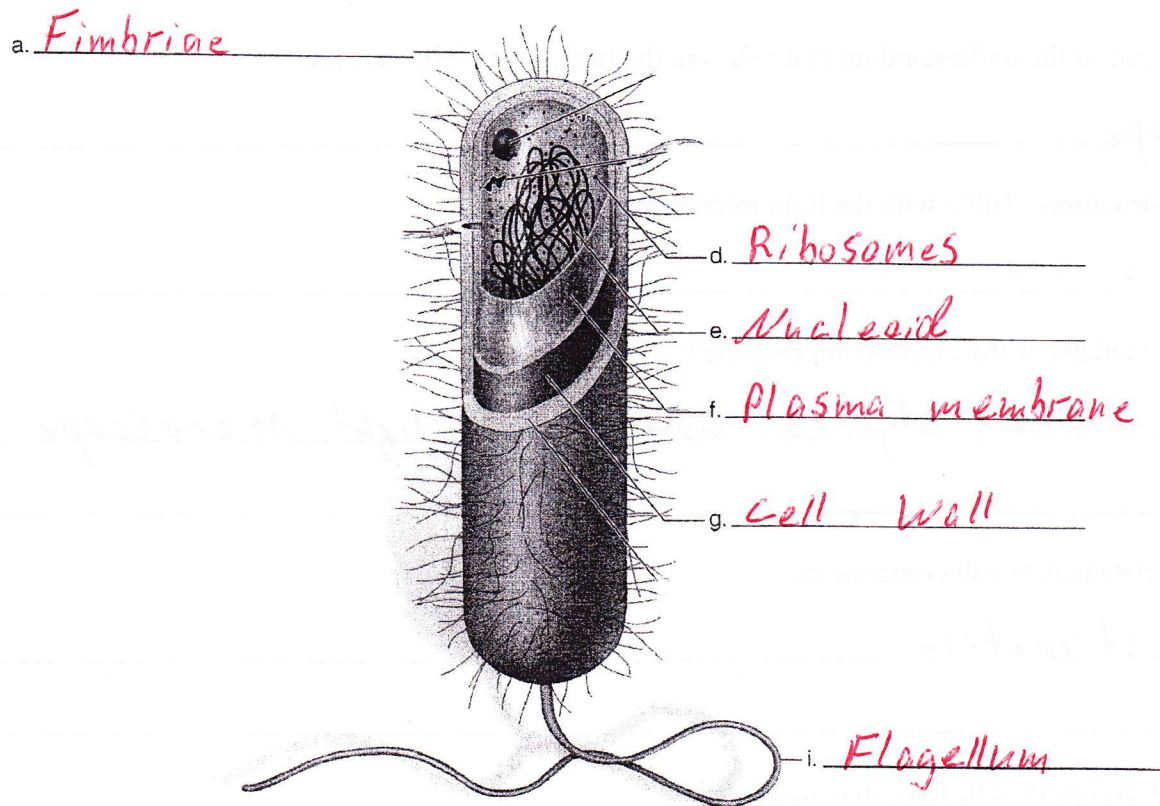
### A TOUR OF THE CELL

- +1 1. The tool that lead to the understanding that cells are the basic unit of life was the  
Microscope
- +1 2. The smallest structures visible with the light microscope are the  
Bacteria
- +1 3. What is the advantage of the electron microscope?  
Can see smaller objects than w/ a light microscope
- +1 4. How do biologists isolate cell components?  
Cell Fractionation
5. What are the 4 things all cells have in common?
- +1 a. All have a plasma membrane
- +1 b. Cytosol
- +1 c. Chromosomes
- +1 d. Ribosomes
- +1 6. What is the limiting factor to cell size?  
SA:V Ratio      Cellular Metabolism
- +2 7. How do prokaryotic and eukaryotic cells differ?  
Prokaryotic → no nucleus  
no membrane organelles

8. Label the following diagram of a bacterial cell, using the terms below.

Cell wall  
Fimbriae  
Flagellum

Plasma membrane  
Ribosome  
Nucleoid



+2 9. Describe the molecular structure of the plasma membrane.

A phospholipid bilayer w/ the hydrophobic tails clustered in the interior & the phosphate heads facing the hydrophilic outside & inside of the cell; proteins are embedded in & attached to the membrane

+1 10. If a eukaryotic cell has a diameter that is 10 times that of a bacterial cell, proportionally how much more surface area would the eukaryotic cell have?

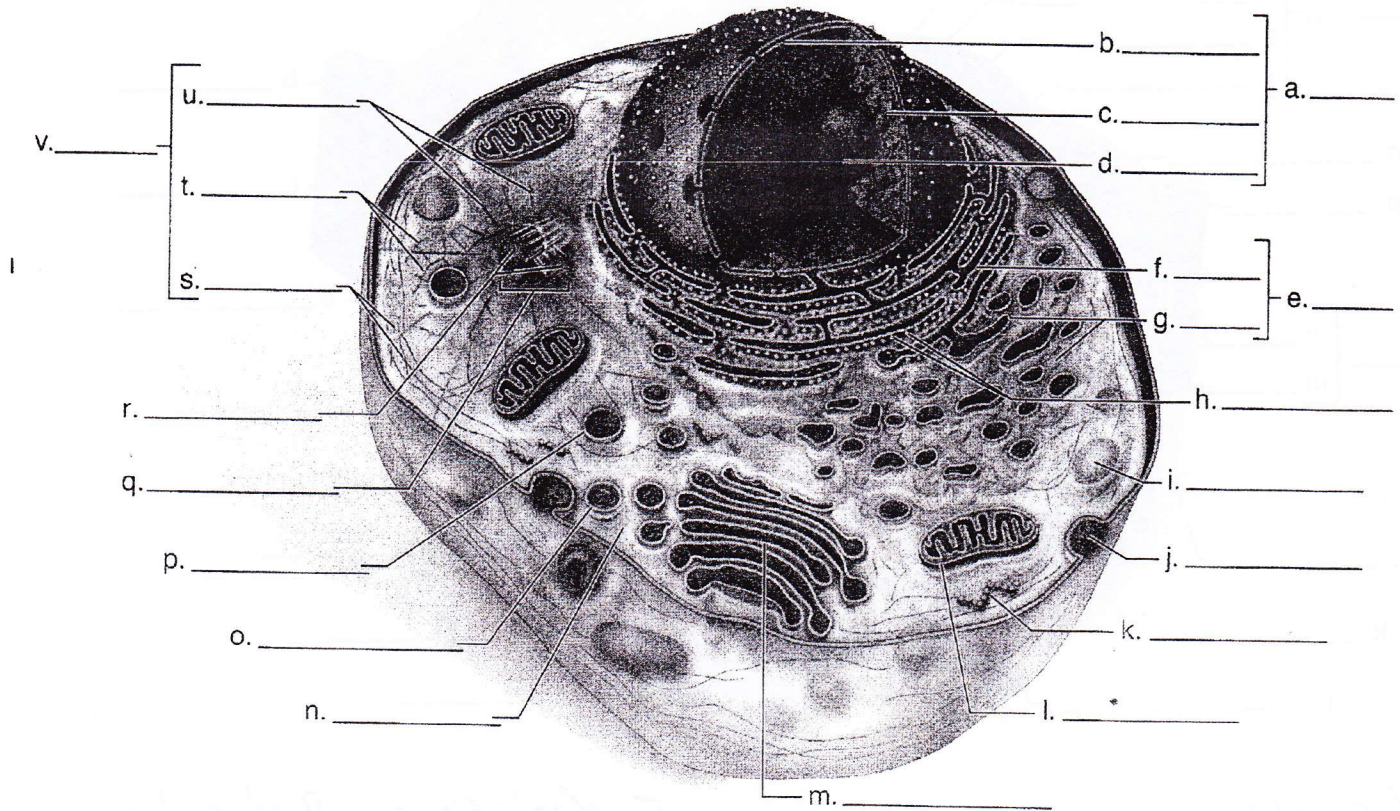
$10^2$  or 100x the SA

+1 11. Proportionally how much more volume would it have?

$10^3$  or 1,000x the Volume

12. Label the following diagrams of an animal and plant cell by filling in the corresponding blanks below the diagram.

+6



a. Nucleus

b. Nuclear envelope

c. Chromatin

d. Nucleolus

e. Endoplasmic Reticulum

f. Rough ER

g. Smooth ER

h. Ribosomes

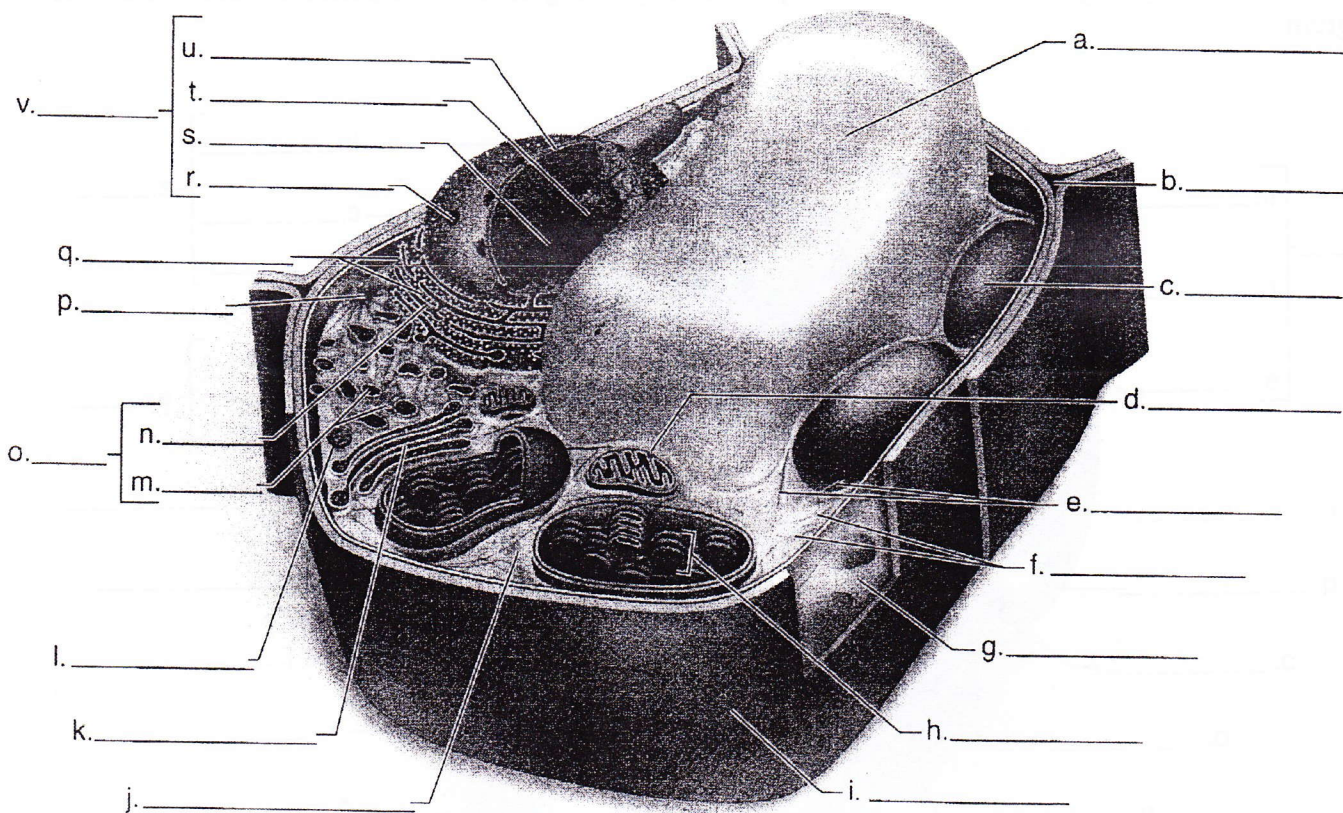
i. Mitochondria

m. Golgi apparatus

n. Cytosol

q. Centrosome

v. Cytoskeleton



+7

- a. Vacuole
- d. Mitochondria
- i. Cell wall
- j. Cytosol
- k. Golgi apparatus
- m. Smooth ER
- n. Rough ER

- o. Endoplasmic Reticulum
- q. Ribosomes
- r. Nuclear pore
- s. Chromatin
- t. Nucleolus
- u. Nuclear envelope
- v. Nucleus

13. Write the function of each of the following cell structures.

+1	Nuclear membrane	seperates contents of nucleus from cytoplasm
+1	Nuclear pores	Regulates the entrance + exit proteins, RNA, macromolecules
+1	Nuclear lamina	maintains shape of nucleus
+1	Chromatin	Makes up chromosomes
+1	Nucleolus	- rRNA synthesized - rRNA + proteins assembled
+1	Ribosome	Protein synthesis
+1	Smooth ER	lipid synthesis carbo metabolism detoxification
+1	Rough ER	Protein secretion membrane synthesis
+1	Golgi apparatus	Manufacturing, warehousing, sorting, + shipping
+1	Lysosome	Intracellular digestion

14. How does the nucleus control protein synthesis in the cytoplasm?

+2 The genetic instructions for specific proteins are transcribed from DNA into mRNA, which then passes into the cytoplasm to complex w/ ribosomes where it is translated into the primary structure of proteins.

+5 15. Choose the most appropriate answer for each term.

- |                                     |  |
|-------------------------------------|--|
| a. <u>C</u> prokaryotic cell        | A. An interior region of prokaryotic cells where DNA is found  |
| b. <u>G</u> plasma membrane         | B. The structural basis of the plasma membrane   |
| c. <u>I</u> cytoplasm               | C. The type of cell that lacks a nucleus   |
| d. <u>F</u> ribosomes               | D. A physical relationship that constrains increases in cell size                                      |
| e. <u>H</u> nucleus                 | E. The smallest unit of life that retains all the properties of life                                   |
| f. <u>J</u> eukaryotic cells        | F. Molecular structures that are involved in building proteins   |
| g. <u>D</u> surface-to-volume ratio | G. The thin outermost membrane of cells that separates metabolic activities from random outside events |
| h. <u>B</u> lipid bilayer           | H. In eukaryotic cells, the membranous sac that contains the DNA                                       |
| i. <u>A</u> nucleoid                | I. The area between the plasma membrane and the region of DNA  |
| j. <u>E</u> cell                    | J. A type of cell possessing internal membranes that divide the cytoplasm into compartments            |

+4 16. Match each of the following terms with its correct definition.

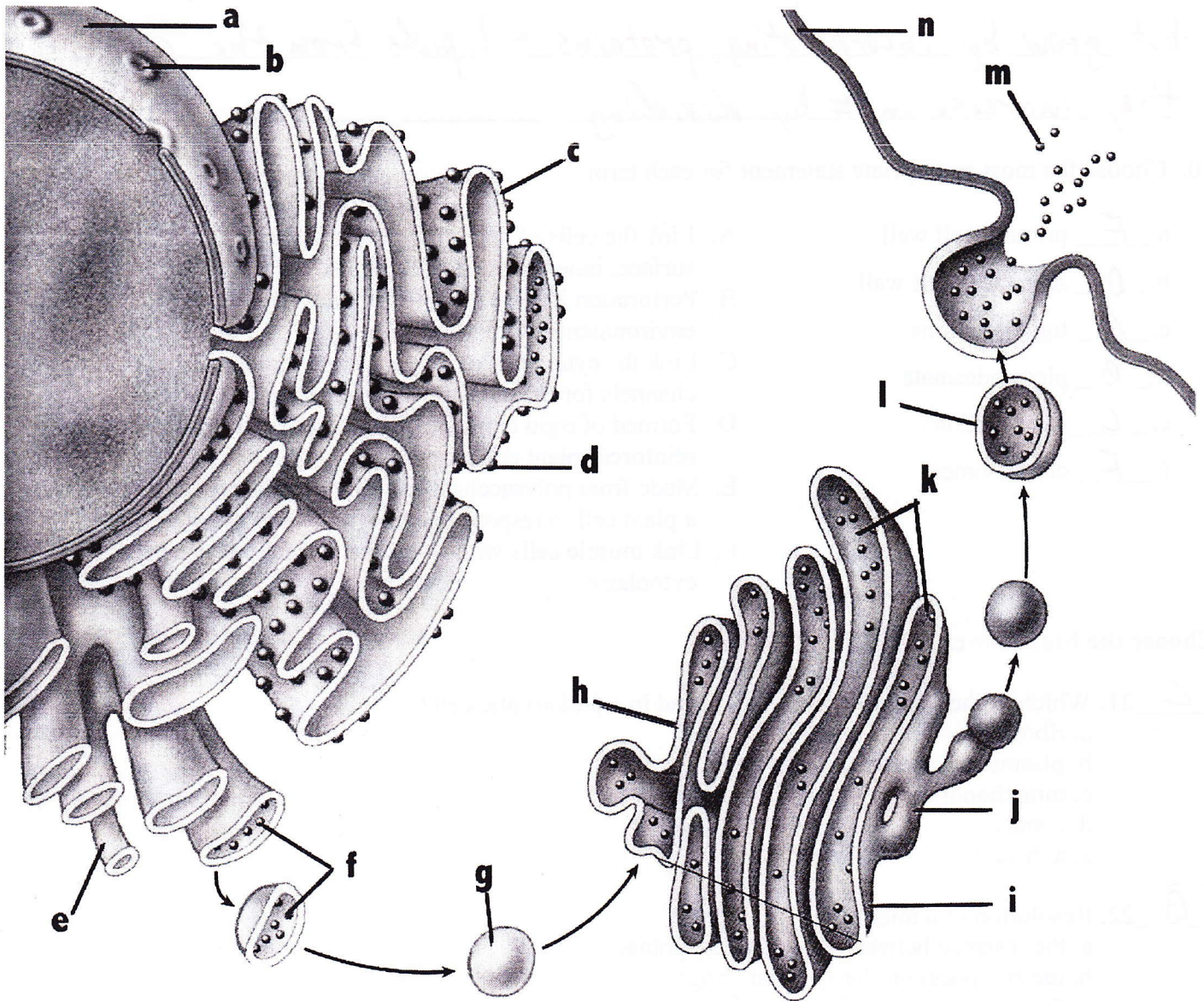
- |                              |   |
|------------------------------|---|
| a. <u>F</u> chromosomes      | A. Construction site for ribosomes  |
| b. <u>A</u> nucleolus        | B. Involved in the manufacture, storage, and secretion of proteins            |
| c. <u>H</u> smooth ER        | C. The cell's collection of DNA and associated proteins                       |
| d. <u>G</u> nuclear envelope | D. Organelle of digestion; can digest other organelles                        |
| e. <u>B</u> rough ER         | E. Attaches sugar side chains to proteins and lipids                          |
| f. <u>L</u> chromatin        | F. A double-stranded DNA molecule and associated proteins                     |
| g. <u>J</u> peroxisomes      | G. A double membrane that encloses the DNA                                    |
| h. <u>D</u> lysosomes        | H. Makes lipids for the cell membrane   |
| i. <u>E</u> golgi body       | I. Contains enzymes to digest fatty acids, amino acids, and hydrogen peroxide |

+4 17. For each of the following statements, choose the most appropriate structure of the cytoskeleton from the list below. Structures may be used once, more than once, or not at all.

- |                  |                 |                           |                |
|------------------|-----------------|---------------------------|----------------|
| A) microfilament | B) microtubules | C) intermediate filaments | D) Centrosomes |
| E) centrioles    | F) flagella     | G) cilia                  |                |

- a. A involved in the process of cytoplasmic streaming
- b. B comprised of hollow cylinders of tubulin monomers
- c. D located near the nucleus; a microtubule organizing center
- d. A comprised of a twisted double chain of actin monomers
- e. B involved in moving chromosomes during cell division
- f. F provides movement for a cell; beats in an undulating motion
- g. C reinforce eukaryotic nuclear envelopes

18. The below diagram traces the path of a protein-based secretion from a secretory cell. Label the organelles involved.



[http://www.fredonia.edu/bio241/images/5.19\\_ER\\_and\\_Golgi.jpg](http://www.fredonia.edu/bio241/images/5.19_ER_and_Golgi.jpg)

- +7
- a. Nucleus
  - b. Nuclear pore
  - c. Rough ER
  - d. Ribosomes
  - e. Smooth ER
  - f. Protein
  - g. Transport Vesicle

- h. Cis Face
- i. Golgi Apparatus
- j. Trans Face
- k. Cisternae
- l. Secretory Vesicle
- m. Proteins
- n. Plasma membrane

+1 19. Why are peroxisomes not considered part of the endomembrane system?

Peroxisomes do not bud from the endomembrane system, but grow by incorporating proteins & lipids from the cytosol; they increase in # by dividing

+3 20. Choose the most appropriate statement for each term.

- |                                 |  |
|---------------------------------|--|
| a. <u>F</u> primary cell wall   | A. Link the cells of epithelial tissues lining the body's outer surface, inner cavities, and organs                  |
| b. <u>D</u> secondary cell wall | B. Perforation in the cell walls of plants connecting the chemical environments of adjacent cells                    |
| c. <u>A</u> tight junctions     | C. Link the cytoplasm of neighboring animal cells and are open channels for the rapid flow of signals and substances |
| d. <u>B</u> plasmodesmata       | D. Formed of rigid cellulose, lignin, and additional deposits; reinforces plant cell shape                           |
| e. <u>C</u> gap junctions       | E. Made from polysaccharides; thin, pliable structure that allows a plant cell to respond to changing water pressure |
| f. <u>F</u> desmosomes          | F. Link muscle cells with rivet-like projections penetrating the cytoplasm   |

Choose the best answer.

+1/2 C 21. Which of the following is/are not found in a prokaryotic cell?

- a. ribosomes
- b. plasma membrane
- c. mitochondria
- d. a and c
- e. a, b, and c

+1/2 B 22. Resolution of a microscope is

- a. the distance between two separate points.
- b. the sharpness or clarity of an image.
- c. the degree of magnification of an image.
- d. the depth of focus on a specimen's surface.
- e. the wavelength of light.

+1/2 D 23. Which of the following is *not* a similarity among the nucleus, chloroplasts, and mitochondria?

- a. They contain DNA.
- b. They are bounded by two phospholipids bilayer membranes.
- c. They can divide to reproduce themselves.
- d. They are derived from the endoplasmic reticulum system.
- e. Their membranes are associated with specific proteins.

- <sup>+1/2</sup> E 24. The pores in the nuclear envelope provide for the movement of
- proteins into the nucleus.
  - ribosomal subunits out of the nucleus.
  - mRNA out of the nucleus.
  - signal molecules into the nucleus.
  - all of the above.
- <sup>+1/2</sup> A 25. The ultrastructure of a chloroplast could be seen with the best resolution using
- transmission electron microscopy.
  - scanning electron microscopy.
  - phase-contrast light microscopy.
  - cell fractionation.
  - fluorescence microscopy.
- <sup>+1/2</sup> D 26. Which of the following is *incorrectly* paired with its function?
- peroxisome-contains enzymes that breakdown  $H_2O_2$
  - nucleolus-produces ribosomal RNA, assembles ribosome subunits
  - Golgi apparatus-processes, tags, and ships cellular products
  - lysosome-food sac formed by Phagocytosis
  - ECM (extracellular matrix)-supports and anchors cells, communicates information with inside of cell
- <sup>+1/2</sup> C 27. The cells of an ant and an elephant are, on average, the same size; an elephant just has more cells. What is the main advantage of small cell size?
- Small cells are easier to organize into tissues and organs.
  - A small cell has a larger plasma membrane surface area than does a large cell, facilitating the exchange of sufficient materials with its environment.
  - A small cell has a smaller cytoplasmic volume relative to its surface area, which helps to ensure the exchange of sufficient materials across its plasma membrane.
  - Small cells require less oxygen than do large cells.
  - The cytoskeleton of a large cell would have to be so large that cells would be too heavy.
- <sup>+1/2</sup> C 28. A growing plant cell elongates primarily by
- increasing the number of vacuoles.
  - synthesizing more cytoplasm.
  - taking up water into its central vacuole.
  - synthesizing more cellulose.
  - producing a secondary cell wall.
- <sup>+1/2</sup> B 29. The innermost portion of the cell wall of a plant cell specialized for support is the
- primary cell wall.
  - secondary cell wall.
  - middle lamella.
  - plasma membrane.
  - plasmodesmata.
- <sup>+1/2</sup> D 30. Contractile elements of muscle cells are
- intermediate filaments.
  - centrioles.
  - microtubules.
  - actin filaments (microfilaments).
  - fibronectins.

- $+\frac{1}{2}$  E 31. Microtubules are components of all of the following *except*
- centrioles.
  - the spindle apparatus for separating chromosomes in cell division.
  - tracks along which organelles can move using motor molecules.
  - flagella and cilia.
  - the cleavage furrow that pinches apart cells in animal cell division.
- $+\frac{1}{2}$  B 32. Of the following, which is probably the most common route for membrane flow in the endomembrane system?
- rough ER  $\rightarrow$  Golgi  $\rightarrow$  lysosomes  $\rightarrow$  nuclear membrane  $\rightarrow$  plasma membrane
  - rough ER  $\rightarrow$  transport vesicles  $\rightarrow$  Golgi  $\rightarrow$  vesicles  $\rightarrow$  plasma membrane
  - nuclear envelope  $\rightarrow$  rough ER  $\rightarrow$  Golgi  $\rightarrow$  smooth ER  $\rightarrow$  lysosomes
  - rough ER  $\rightarrow$  vesicles  $\rightarrow$  Golgi  $\rightarrow$  smooth ER  $\rightarrow$  plasma membrane
  - smooth ER  $\rightarrow$  vesicles  $\rightarrow$  Golgi  $\rightarrow$  vesicles  $\rightarrow$  peroxisomes
- $+\frac{1}{2}$  B 33. Proteins to be used within the cytosol are generally synthesized
- by ribosomes bound to rough ER.
  - by free ribosomes.
  - by the nucleolus.
  - within the Golgi apparatus.
  - by mitochondria and chloroplasts.
- $+\frac{1}{2}$  C 34. Plasmodesmata in plant cells are similar in function to
- desmosomes.
  - tight junctions.
  - gap junctions.
  - the extracellular matrix.
  - integrins.
- $+\frac{1}{2}$  E 35. In an animal cell fractionation procedure, the first pellet formed would most likely contain
- the extracellular matrix.
  - ribosomes.
  - mitochondria.
  - lysosomes.
  - nuclei.

Use the cells described below to answer for questions 16-20, the following question:

In which cell would you expect to find. . .

- muscle cell in the thigh muscle of a long-distance runner
- pancreatic cell that manufactures digestive enzymes
- macrophage (white blood cell) that engulfs bacteria
- epithelial cell lining digestive tract
- ovarian cell that produces estrogen (a steroid hormone)

- $+\frac{1}{2}$  D 36. the most tight junctions?       $+\frac{1}{2}$  B 39. the most bound ribosomes?
- $+\frac{1}{2}$  C 37. the most lysosomes?       $+\frac{1}{2}$  A 40. the most mitochondria?
- $+\frac{1}{2}$  E 38. the most smooth endoplasmic reticulum?